

### Math 10 Chapter 3 Review of Factoring

Multiplying (Expanding)	Factoring (Dividing)
<p><b>Type 1: Monomial x Binomial</b>  <b>Monomial x Trinomial</b></p> <p>Ex: <math>3(x + 4) = 3x + 12</math>  <math>-2(x^2 + 2x - 1) = -2x^2 - 4x + 2</math></p> <p><u>Questions to try</u>  Multiply the following:</p> <ol style="list-style-type: none"> <li>1. <math>5(x - 3)</math></li> <li>2. <math>x(x + 5)</math></li> <li>3. <math>2x(x^2 - 3x + 2)</math></li> <li>4. <math>-4(x - 5)</math></li> <li>5. <math>-3x(x + 2y)</math></li> </ol>	<p><b>Type 1: Factoring GCF</b></p> <p>Ex: <math>2x + 10 = 2(x + 5)</math> Note: GCF is 2  <math>-3x^2 + 6x = -3x(x - 2)</math> Note: GCF is <math>-3x</math></p> <p><u>Questions to try</u>  Factor the following:</p> <ol style="list-style-type: none"> <li>1. <math>4x + 12</math></li> <li>2. <math>x^2 - 6xy</math></li> <li>3. <math>10x^2 + 20x</math></li> <li>4. <math>-5x - 10</math></li> <li>5. <math>-4x^2y + 8xy</math></li> </ol>
<p><b>Type 2: Binomial x Binomial</b>  <b>Pattern is <math>(a + b)(a - b) = a^2 - b^2</math></b></p> <p>Ex: <math>(x + 7)(x - 7) = x^2 - 49</math>  <math>(2y + 3)(2y - 3) = 4y^2 - 9</math></p> <p><u>Questions to try</u>  Multiply the following:</p> <ol style="list-style-type: none"> <li>1. <math>(x + 6)(x - 6)</math></li> <li>2. <math>(3y + 5)(3y - 5)</math></li> <li>3. <math>(2 + x)(2 - x)</math></li> <li>4. <math>(2x + 5y)(2x - 5y)</math></li> <li>5. <math>(x + 2y)(x - 2y)</math></li> </ol>	<p><b>Type 2: Factoring Difference of 2 Squares</b>  <b>Pattern is <math>a^2 - b^2 = (a + b)(a - b)</math></b></p> <p>Ex: <math>x^2 - 4 = (x + 2)(x - 2)</math>  <math>25y^2 - 16z^2 = (5y + 4z)(5y - 4z)</math></p> <p><u>Questions to try</u>  Factor the following:</p> <ol style="list-style-type: none"> <li>1. <math>x^2 - 25</math></li> <li>2. <math>100x^2 - 9</math></li> <li>3. <math>49 - y^2</math></li> <li>4. <math>16x^2 - 81z^2</math></li> <li>5. <math>y^2 - 9z^2</math></li> </ol>

<p><b>Type 3: Binomial x Binomial</b>  <math>(x \pm ?)(x \pm ?)</math></p> <p><b>Pattern: Multiply 2 numbers to get the last term</b>  <b>Add 2 numbers to get the middle term</b></p> <p><b>Or</b></p> <p><b>Use FOIL (Double Distributive Property)</b></p> <p>Ex: <math>(x + 3)(x + 4) = x^2 + 7x + 12</math>  <math>(x - 3)(x - 4) = x^2 - 7x + 12</math>  <math>(x + 3)(x - 4) = x^2 - 1x - 12</math> or <math>x^2 - x - 12</math>  <math>(x - 3)(x + 4) = x^2 + 1x - 12</math> or <math>x^2 + x - 12</math></p> <p><u>Questions to try</u>  Multiply the following:</p> <ol style="list-style-type: none"> <li>1. <math>(x + 2)(x + 5)</math></li> <li>2. <math>(y + 1)(y + 7)</math></li> <li>3. <math>(x - 5)(x - 7)</math></li> <li>4. <math>(y - 2)(y - 3)</math></li> <li>5. <math>(x + 2)(x - 4)</math></li> <li>6. <math>(x + 6)(x - 8)</math></li> <li>7. <math>(y - 5)(y + 1)</math></li> <li>8. <math>(y - 8)(y + 10)</math></li> </ol>	<p><b>Type 3: Factoring Trinomials</b>  <math>(1x^2 \text{ only} \dots x^2 \pm ?x \pm ?)</math></p> <p><b>Pattern: Find 2 numbers whose product is last #</b>  <b>Same 2 numbers add up to middle #</b></p> <p>Ex: <math>x^2 + 8x + 15 = (x + 5)(x + 3)</math>  <math>x^2 - 8x + 15 = (x - 5)(x - 3)</math>  <math>x^2 - 2x - 15 = (x - 5)(x + 3)</math>  <math>x^2 + 2x - 15 = (x + 5)(x - 3)</math></p> <p><u>Questions to try</u>  Factor the following:</p> <ol style="list-style-type: none"> <li>1. <math>x^2 + 10x + 16</math></li> <li>2. <math>y^2 + 9y + 18</math></li> <li>3. <math>x^2 - 7x + 10</math></li> <li>4. <math>y^2 - 10y + 9</math></li> <li>5. <math>x^2 - 3x - 28</math></li> <li>6. <math>x^2 - 7x - 18</math></li> <li>7. <math>y^2 + 2y - 63</math></li> <li>8. <math>y^2 + 5y - 36</math></li> </ol>
<p><b>Type 4: Combos of Types 1,2,3 (GCF + one other)</b></p> <p>Ex: <math>2x^2 - 8 = 2(x^2 - 4)</math>  <math>= 2(x + 2)(x - 2)</math></p> <p><math>x^3 + 3x^2 - 10x = x(x^2 + 3x - 10)</math>  <math>= x(x + 5)(x - 2)</math></p>	<p><b>Type 4: Combos of Types 1,2,3 (GCF + one other)</b></p> <p><u>Questions to try</u> Factor the following:</p> <ol style="list-style-type: none"> <li>1. <math>3x^2 - 27</math></li> <li>2. <math>10x^2 + 20x - 150</math></li> </ol>

**Type 5: Binomial x Binomial**  
 $(?x \pm ?)(?x \pm ?)$

Use FOIL (double distributive property)

or

Box Method

Not both 1x's here anymore!

Ex:  $(2x + 3)(3x + 4)$

**FOIL:**  $6x^2 + 8x + 9x + 12$  (First, Outside, Inside, Last)  
 $6x^2 + 17x + 12$

OR (Box Method)

	2x	+3
3x		
+4		

	2x	+3
3x	$6x^2$	$9x$
+4	$8x$	$12$

$= 6x^2 + 9x + 8x + 12$

$= 6x^2 + 17x + 12$

Questions to try

Multiply the following:

1.  $(2x + 5)(x + 3)$
2.  $(3x + 2)(2x + 1)$
3.  $(x - 4)(3x - 5)$
4.  $(2x + 1)(3x - 2)$

**Type 5: Factoring Trinomials**  
 $(?x^2 \pm ?x \pm ?)$

Use Trial\_and\_Error Method

or

Box Method

Not just  $1x^2$  here anymore!

Ex:  $2x^2 + 5x + 2 = (2x + 1)(x + 2)$

(Try numbers and Test by Multiplying until it works.)  
 (This method is only good if numbers are small!)

OR (Box Method)

$2x^2 + 5x + 2$   
 $4x^2$   
 $4x \quad 1x$

Multiply the two end terms.

Now find two numbers that multiply to get  $4x^2$  and add to get  $5x$ .  
 Fill Box with these values.

$2x^2$	$4x$
$1x$	$2$

Now find GCF of 2 rows and 2 columns.

	x	+2
2x	$2x^2$	$4x$
+1	$1x$	$2$

Questions to try

Factor the following:

1.  $2x^2 + 13x + 15$
2.  $6x^2 + 11x + 3$
3.  $2x^2 - 3x - 9$
4.  $3x^2 - 19x + 20$